Remarks

In the Office Action dated August 20, 2008, claims 1-8, 10, 11, 17-24, 46-49 and 51-54 were pending, and all are now under rejection. Claims 9, 12-16, 25-26, 34 and 36-40 have previously been cancelled and claims 27-33, 35, 41-43 and 50 have previously been withdrawn. In the instant response, claims 1, 11 and 53 have been amended. No new matter has been added by these amendments. Reexamination and reconsideration of the claims is respectfully requested in view of the following remarks.

Rejections Under 35 U.S.C. §112, First Paragraph – *Written Description*

The Examiner has maintained the rejection of claims 1-8, 10, 11, 17-24, 46-49 and 51-52 and is newly rejecting claim 53 under 35 U.S.C. §112, first paragraph, "as failing to comply with the written description requirement." Applicants respectfully disagree with the Examiner and traverse the rejection.

The amended claims are drawn to a *B. oleracea* plant having clubroot resistance to multiple pathotypes of clubroot disease. The claims require that the resistance to clubroot be monogenic and dominant, wherein the resistance is obtained from a *B. rapa* plant. A *B. oleracea* plant having these characteristics is set forth in the specification. Dependent claim 53 further delineates that the *B. rapa* plant be the Chinese cabbage F1 hybrid 'Parkin'.

Applicants thank the Examiner for the thorough examination of the previous claims and the detailed Office Action responding thereto. In that Office Action dated August 20, 2008, the Examiner has made several arguments to support his maintaining of the Written Description rejection. Applicants believe that these arguments are best captured in two main points: (1) It is unclear what *B. oleracea* and what *B. rapa* plants are contemplated by the claims given the number of variants within those species; and (2) Applicants were not in possession of the broad genus of *B. oleracea* plants having the claimed characteristics as the Examiner indicates that Applicants were only in possession of *B. oleracea* line CFL667.

As noted, Applicants respectfully traverse this rejection. With regards to which *B. oleracea* and *B. rapa* plants are contemplated by the claims, particularly independent claims 1 and 11, the simple answer is that all variants falling within these species are claimed. The methods described in the application do not have limited applicability to only the specific, exact lines used by Applicants.

Any *B. oleracea* plant can be used as the recipient of a monogenic, dominant clubroot resistance obtained from any *B. rapa* plant, as described in the application. Whether the *B. oleracea* plant is a broccoli or cauliflower does not change the method or the resulting product. The resulting product would still be a *B. oleracea* plant with monogenic and dominant clubroot resistance obtained from a *B. rapa* plant. According to the amended claims, the resistance must be to multiple clubroot pathotypes, thus, the *B. rapa* plant must display a resistance to more than one pathotype of clubroot disease.

The embodiments in amended claims 1 and 11 are the core of Applicants' invention: a *B. oleracea* plant with monogenic and dominant clubroot resistance to multiple clubroot pathotypes wherein the resistance is obtained from a *B. rapa* plant. However, the Examiner is seeking to limit the Applicants' solely to the lines used and specifically cited in the specification. Applicants respectfully submit that such a limitation ignores the true advancement that has been accomplished and leaves Applicants without protection for their invention. Applicants have disclosed in the instant application how they were able to create the claimed embodiment, yet, if the claims are limited to the specifically created line, any other party can simply follow the detailed instructions provided in the specification of the patent application and use a different *B.* rapa plant as a source of resistance to work around the claims. Applicants have invented more than simply line CFL667 and as such should be awarded further protection.

With regards to possession and the Examiner's statement that Applicants were only in possession of line CFL667, Applicants draw the Examiner's attention to pages 11 and 12 of the specification where the production of multiple variants of *B. oleracea* with the monogenic and dominant clubroot resistance from *B. rapa* is described. For example, beginning on line 16 of page 11, it is noted that "the resistance to clubroot was transferred to other *B. oleraceas*, in particular white cabbage, cauliflower and Brussels sprouts, using standard breeding techniques well-knownin the Brassica art. The trait was also further introgressed into *B. oleracea* elite lines." Continuing on from here until approximately line 18 on page 12, the process for introgressing this resistance to other *B. oleraceas* is described. Further, on page 20 in Example 1 under "Transfer to other *B. oleraceas*" it is noted that this resistance was transferred to other *B. oleraceas* variants. In Example 3 on page 22 in the description of Table 1, it is described that two cauliflower hybrids were obtained that carried the described clubroot resistance, F308 and F311. Again in Example 3 on page

23 in the description for Table 3 (which continues onto page 24), it is described that four additional resistance cauliflowers were obtained (D249, D506, E245 and E246), as well as two resistant Brussels sprouts hybrids (SPR666 and A876) and two resistant white cabbage hybrids (F1182 and F1187). Thus, Applicants would submit that it is quite clear from the specification and the Examples provided therein that multiple *B. oleracea* variants were in the possession of Applicants and that this fact supports the previous arguments made in this response and in the responses dated Dec 7, 2007 and May 13, 2008 that the claimed subject matter is adequately described in the specification.

While Applicants maintain that independent claims 1 and 11 are be fully allowable and are adequately described in the application as delineated above, Applicants further direct the Examiner's attention to claim 53, which specifically notes the source of resistance as Chinese cabbage F1 hybrid 'Parkin'. With this source identified, it is clear what *B. rapa* plant is contemplated. Applicants believe that this claim should be allowed based on this additional clarification. It is now known based on the specification provided by Applicants that the clubroot resistance found in 'Parkin' can be successfully and stably transferred to *B. oleracea*. Any person of skill in the art would readily recognize this and be able to successfully create multiple variants of resistant *B. olereaceas* through use of 'Parkin' as a source.

Applicants believe that all claims are adequately described in the specification and respectfully request the withdrawal of this rejection.

Rejections Under 35 U.S.C. §112, First Paragraph – *Enablement*

The Examiner has rejected claims 1-8, 10, 11, 17-24, 46-49 and 51-53 under 35 U.S.C. §112, first paragraph, as failing to comply with the enablement requirement. Applicants respectfully disagree with the Examiner and traverse the rejection.

The Examiner states that only line CFL667 has been enabled by the specification and that all other *B. oleraceas* contemplated by the claims are not enabled as the specification does not enable "any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the invention commensurate in scope with these claims." The Examiner goes on to cite the *Wands* factors and specifically notes several of these factors and then goes on to point out under each that specification only enables line CFL667.

Applicants respectfully disagree with this conclusion. The specification clearly enables a person of ordinary skill in the art to make and use the claimed invention. The specification provides specific guidance, *using Chinese cabbage 'Parkin'* ***as an example*** of a source for the monogenic and dominant resistance in *B. rapa*. At a minimum, the specification clearly enables cauliflower as the ultimate *B. oleracea* product as it cannot be said that undue experimentation would be needed to follow the same steps outlined in the specification to make a different, resistant cauliflower plant. (deposited CFL667 is a hybrid cauliflower) The same can be said for any other *B. oleracea*. The method would be exactly as described in the specification. Any monogenic and dominantly clubroot resistant *B. rapa* plant that is resistance to multiple clubroot races could be used as a source for the resistance. A person of ordinary skill in the art would understand this and then be able to use this source on any *B. oleracea* plant. There is no requirement for enablement that every possible embodiment captured by the claim be found in the specification, all that matters is that the specification enable a person of ordinary skill in the art to practice the embodiment. The specification is sufficiently clear to allow anyone of ordinary skill in the art to practice the invention.

Additionally, Applicants point a person wishing to practice the invention must only create a *B. oleracea* plant resistant to multiple pathotypes of clubroot disease, wherein the resistance is obtained from a clubroot resistant *B. rapa* plant and the resistance to clubroot is monogenic and dominant. As Applicants demonstrated, in Example 3 and mentioned on page 20 (as well as above in arguments for adequate description) the resistance, once introgressed into **one** *B. oleracea* plant, was able to be transferred to any *B. oleracea* background of Applicants choosing through a simple backcross method that is well within the skill of a person of ordinary skill in the art. The enablement would be a text-book backcross method.

Applicants also note that the Examiner has rejected the claims as obvious. Applicants do not understand how it is possible for the same claims that are said to not be enabled **in light of the specification** to also somehow be obvious in view of the prior art **without** the guidance of the specification. It seems that if a person of ordinary skill would find the invention to be obvious in view of the prior art, as the Examiner has so found, that it would clearly be enabled given the provided specification. If the Examiner believes that a person could create the invention **before** the specification, then he should be willing to accept that it would be readily possible **after** seeing the specification.

Applicants submit that the claims as they stand are completely enabled by the specification and further draw the Examiner's attention to the dependent claims which further delineate the source material and *B. oleracea* variants.

The Examiner has also rejected claims 53 and 54 (claim 10 has been cancelled) as not enabled because 'Parkin' and a progeny of CFL667 are essential to the claimed subject matter and thus must be deposited.

With regards to claim 54 and the progeny of CFL667, Applicants disagree that any seed needs to be deposited other than CFL667, which already is as stated in the claim. The claim is directed towards plants of line CFL667 or any progeny/ancestor thereof that maintains the monogenic and dominant clubroot resistance that is found in line CFL667. The number of possible progeny plants is infinite. Any person who obtains line CFL667 could cross this with another *B. oleracea* plant and create a progeny that maintains these characteristics. It would be impossible for Applicants to deposit such a material.

With regards to 'Parkin', this line is currently publically available from Takii Seeds in Japan as noted in the specification and acknowledge by the Examiner. Thus, at this time, the seed is available and no deposit is necessary. However, Applicants will move forward to obtain the required allotment of seed for deposit of 'Parkin'.

Rejections Under 35 U.S.C. §103, Obviousness

Applicants confirm the Examiner's assumption that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made.

The Examiner has rejected claims 1-5, 7, 8, 11, 17-24, 46 and 47 under 35 USC §103 as being unpatentable over Chiang et al in view of Kuginuki et al, further in view of Landry et al.

Applicants initially note that in the previous Office Action, no rejections based on enablement and obviousness were made, whereas they were made in the first Office Action. Applicants are curious as to why both rejections have reappeared without any substantive amendments being made to the claims. Applicants again also point out the impracticability of claims being both non-enabled yet also obvious. Nonetheless, Applicants argue against the Examiner's rejection as follows.

Regarding claims 1 and 11, the Examiner cites Chiang and Kuginuki for providing the elements of the claimed subject matter when taken in combination. For Chiang, the Examiner states at number 34 that Chiang teaches "a *B. oleracea* plant resistant to clubroot disease, wherein the resistance is obtained from a clubroot resistant *B. napus* plant and the resistance to clubroot is monogenic and dominant". Then in number 35, the Examiner notes that "Chiang et al do not teach a clubroot resistance *B. rapa* plant." Finally, in number 36, the Examiner cites Kuginuki, stating that this reference teaches "a clubroot resistant *B. rapa* plant." The Examiner concludes that it would have been obvious for one of skill in the art to combine teachings to arrive at the present embodiments described in claims 1 and 11.

Applicants respectfully disagree with the Examiner's conclusion regarding the obviousness of now amended claims 1 and 11. Amended claims make note that the clubroot resistant *B. oleracea* plant must be resistant to multiple pathotypes of clubroot disease, and thereby, the *B. rapa* plant from which the resistance is obtained must also be resistant to multiple pathotypes of clubroot disease. Applicants submit that this amendment renders the rejection based on Chiang and Kuginuki moot.

It is specifically stated in several locations within Chiang, and ultimately concluded at the bottom of page 482, that the *B. oleracea* plant therein is resistant only to race 2, and more specifically to the pathotype 16/02/31 according to the ECD set. "The successful transfer of this single dominant gene responsible for resistance to race 2 of the clubroot pathogen from *B. napus* to *B. oleracea*..." Therefore, Applicants submit that Chiang does not teach a *B. oleracea* plant that is resistant to multiple pathotypes, now an element of the claimed subject matter.

Moreover, while the *B. rapa* plant cited by the Examiner from Kuginuki, CR Ryutoku, showed resistance to two collections, Rokunohe-01 and Ano-01, Kuginuki notes that it was not possible to determine the classification of these two collections. However, they do note that "[I]f differential hosts showing ID from 0.0 to 1.9 and from 2.0 to 3.0 were regarded as resistant and susceptible, respectively, Date-01 was classified into race 4 and Yuki-01, **Rokunohe-01 and Ano-01 into race 3** according to Williams' hosts."(Kuginuki, pg 330, end of second column to top of first column on page 331) (emphasis added) While they go on to note that Ano-1 was previously classified as race 2, there were fluctuations that in their opinion "suggest that the populations studied here would not be classified by the hosts of Williams and the ECD." Thus, it would seem

that at best, CR-Rokunohe, based on the results in Kuginuki, could be said to have undetermined resistance to clubroot races, whereas it is their opinion that it is resistant to race 3. Statesd simply, while Kuginuki does disclose a clubroot resistant *B. rapa* plant, it does not disclose a *B. rapa* plant with resistance to multiple pathotypes of clubroot disease as it was impossible for them to classify the pathotypes of the four locations that were tested.

Applicants disagree with the Examiner's position that introgressing a resistance from *B. rapa* to *B. oleracea* would be obvious from the combination of Chiang and Kuginuki, as the Examiner stated on page 14 at number 44. In fact, the creation of a *B. oleracea* plant with resistance to clubroot from a *B. rapa* plant is entirely different than a similar resistance brought in from *B. napus* and is by no means obvious.

Chiang used a tetraploid *B. oleracea* and crossed it with *B. napus* without the necessity of using embryo rescue culture (See Chiang et al., 1977). Although in Chiang they were also confronted with male sterility, as were Applicants, the F1, BC1 and BC2 of Chiang could be used as females, thus there was no need to use embryo rescue. (See Chiang et al., 1985). Applicants performed embryo-rescue multiple times to obtain plants from the cross between *B. rapa* and *B. oleracea* in order to overcome the species barrier.

Applicants are unaware of many examples of stable introgressions of *B. rapa* genes into *B. oleracea*. *B. rapa* has an AA-genome and *B. oleracea* a CC genome, while *B.napus* is an AACC genome, as it is a tetraploid. It is well known in the art that the AA and CC chromosome do not combine together easily and in fact, *B. napus* acts mostly as an amphidiploid without much exchange between the AA and CC pairs. Furthermore, because there are no or only few examples of stable introgressions from AA into CC, and the cross cannot be done without embryo rescue techniques, it is very difficult to predict if a gene can be introgressed stably. This is because apart from the incompatibility of the cross, other barriers need also to be overcome: chromosomes may not pair resulting in loss of the resistance, chromosomes can be eliminated, large linkage groups can be difficult to break and difficulties in disrupting linkages in short linkage blocks. For example, Voorrips (1995) stated that the 2 QTLs found in Landry et al., 1990 from the Chiang and Crete material were presumably originating from *B. napus* but that it was never verified that this was the case. There was no real proof the QTLs came from *B. napus*, and even if they did, there was no real proof that the resistance came from the AA chromosome of *B. napus,* although this was suggested

by the authors. Prior to the instant application, a person of ordinary skill in the art of Brassica breeding would not find it obvious at all to make a direct cross between *B. rapa* and *B. oleracea* and be able to derive from that cross a stable introgression of AA genes into the CC chromosome.

Accordingly, when combined the references cited by the Examiner do not possess each element of the claims, namely they lack a *B. oleracea* plant resistant to multiple pathotypes of clubroot disease and a *B. rapa* plant resistant to multiple pathotypes of clubroot disease. Nor is there any reason to expect that a person of ordinary skill in the art would **expect the result** obtained by Applicants. Thus, Applicants submit that the amended claims and the state of the art prior to the instant application make this rejection moot and respectfully request that this rejection be withdrawn.

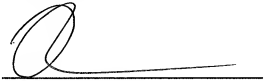
Regarding the dependent claims and arguments made against them, the Applicants initially note that if the independent claims are non-obvious, then all depending claims therefrom must be considered non-obvious. Also, each of the dependent claims now includes the limitations to multiple pathotypes. Applicants will not argue all points made by the Examiner against the dependent claims for the above reasons, however, Applicants will point out the discussion in Landry does not support the Examiner's view that Landry teaches monogenic and dominant resistance to clubroot, as stated in number 39 of the Office Action. Applicant's point to the same paragraph in Landry cited by the Examiner wherein it is shown that a second QTL on LG6 also exists and that this QTL explains much more of the variance than the QTL on LG1 and which is also dominant. The QTL on LG1 has a lesser effect compared to LG6 and even then, both QTLs explain only 61% of the variance against race 2. Thus, it would seem that Landrey et al., expect other minor genes to be present as well. It cannot be taken from this study that a single QTL would provide a complete level of resistance as stated by Chiang and Crete earlier for their assumption of 1 dominant gene with complete effect. (also cited by the Examiner in number 41)

For the above combined reasons, Applicant's respectfully request that the rejection based on obvious be withdrawn.

CONCLUSION

Applicants respectfully submit that all outstanding issues in the present case have been addressed in this paper. Applicants request continued prosecution on the merits and allowance of the claims as presented herein. The Examiner is invited and encouraged to to call the undersigned attorney for Applicants at 919-765-5117 in the event that issues remain unresolved by this response and could be discussed via telephone for clarification.

Respectfully submitted,



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